

# **Bachelor of Computer Applications**

## **Proposed Scheme of Syllabus**

**(CHOICE BASED CREDIT SYSTEM)**

**W.E.F ACADEMIC SESSION 2021-22**

**BACHELOR OF COMPUTER APPLICATIONS  
(BCA) DEGREE**

**GURU GOBIND SINGH INDRAPRASTHA UNIVERSITY  
SECTOR-16C, DWARKA, NEW DELHI-110078**

# Bachelor of Computer Applications

## I. BACHELOR OF COMPUTER APPLICATIONS PROGRAMME DETAILS

### 1. Aim:

The programme covers rudimentary to advance concepts in Computer Science and its applications in various domains. An exceptionally broad range of topics covering current trends and technologies in the field of information technology and computer science are included in the syllabus. The hands on sessions in Computer labs using various Programming languages and tools are also given to have a deep conceptual understanding of the topics to widen the horizon of students' self- experience.

Students, who choose BCA Programme, develop the ability to think critically, logically, analytically and to use and apply current technical concepts and practices in the core development of solutions in the multiple domains.

The knowledge and skills gained with a degree in Computer Application prepare graduates for a wide range of jobs in education, research, government sector, business sector and industry. In broader perspective the mission of teaching BCA is to produce employable IT workforce, that will have sound knowledge of IT and business fundamentals that can be applied to develop and customize solutions for various Enterprises.

### 2. Programme Objectives:

It is envisioned that the graduates passing out BCA degree, will achieve the following objectives and will be able to

Programme Objectives (POs)	Description
PO1	Understand the fundamental concepts of Computers, Software hardware and peripheral devices and evolution of computer technologies.
PO2	Familiarized with Business environment and Information Technology and its Applications in different domains.
PO3	Gain knowledge to identify, explain and apply functional programming and object-oriented programming techniques and use of databases to develop computer programs.
PO4	Analyze, design, implement and evaluate computerized solutions to real life problems, using appropriate computing methods including web applications.
PO5	Understand the front end and backend of software applications.
PO6	Gain expertise in at least one emerging technology.
PO7	Acquire knowledge about computer architecture and organization, networks, network devices and their configuration, protocols, security concepts at various level etc.

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PO8	Apply techniques of software validation and reliability analysis to the development of computer programs.
PO9	Acquire Technical, Communication and management Skills to convey or present information, applications, instructions, policies, procedures, decisions, documentations etc. verbally as well as in writing.
PO10	Recognize the various issues related to society, environment, health and vivid cultures and understand the responsibilities to contribute in providing the solutions.
PO11	Acquire technical skills to lead a productive life in the society as a professional or as an entrepreneur.

### 3. Programme Learning Outcomes:

The completion of the BCA Programme shall enable a student to:

- i) To design, implement, and evaluate computer-based system, process, component, or program to meet desired needs by critical understanding, analysis and synthesis
- ii) Identify applications of Computer Science in other fields in the real world to enhance the career prospects
- iii) Realize the requirement of lifelong learning through continued education and research.
- iv) Use the concepts of best practices and standards to develop user interactive and abstract application
- v) Understand the professional, ethical, legal, security, social issues and responsibilities.

The detailed list of programme learning outcomes is as follows:

PLO	Attribute	Description
PLO1	Communication Skills	The student should be able to communicate the technical information both orally and in writing professionally.
PLO2	Use of Software Tools	Create, select, adapt and apply suitable tools and technologies to a wide range of computational activities.
PLO3	Technical Skills	Acquire necessary knowledge of technical, scientific as well as basic managerial and financial procedures to analyze and solve real world problems within their work domain
PLO4	Domain Awareness	Clarity on both conceptual and application oriented skills in commerce, Finance & Accounting and it Applications in Business context.
PLO5	Technical Support	Must be able to provide technical support for various software applications.
PLO6	Analysis and	Ability to analyze research and investigate complex computing

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	investigation of Complex Computing Problems	problems through design of experiments, analysis and interpretation of data and synthesis of the information to arrive at valid conclusions.
PLO7	Design / Development of Solutions	Apply the knowledge gained in core courses to a broad range of advanced topics in computer science, to learn and develop sophisticated technical products independently.
PLO8	Imbibe Cyber Ethics	Awareness on ethics, values, sustainability and creativity aspects of technical solutions.

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## II. CHOICE BASED CREDIT SYSTEM (CBCS)

The CBCS provides an opportunity for the students to choose courses from the prescribed courses comprising core, elective/minor or skill based courses.

### 1. Types of courses in CHOICE BASED CREDIT SYSTEM (CBCS)

**1.1 Core Course:** A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course.

**1.2 Elective Course:** Generally a course which can be chosen from a pool of courses and which may be very specific or specialized or advanced or supportive to the discipline/ subject of study or which provides an extended scope or which enables an exposure to some other discipline/subject/domain or nurtures the candidate's proficiency/skill is called an Elective Course.

a) **Discipline Specific Elective (DSE) Course:** Elective courses offered by the main discipline/subject of study are referred as Discipline Specific Electives.

b) **Project work/Dissertation** is considered as a special course involving application of knowledge in solving / analyzing /exploring a real life situation / difficult problem. A candidate studies such a course on his own with an advisory support by a teacher/faculty member. The work done will have to be submitted in writing as a project report / dissertation.

c) **Generic Elective (GE) Course:** Elective courses that are generic or interdisciplinary by nature chosen from an unrelated discipline/ subject with an intention to seek exposure beyond discipline/s of choice are called Generic Electives. Students will have to choose one elective each in the third and fourth semester from the lists GE1 to GE2 given in this syllabus.

### 1.3 Ability Enhancement Courses (AEC)

The Ability Enhancement (AE) Courses are the course that lead to Knowledge enhancement. These are of two types.

a) **AE Compulsory Course (AECC):** Environmental Studies, English Communication/MIL Communication.

b) **AE Elective Course (AEEC):** AEEC courses are value-based and/or skill-based and are aimed at providing hands-on-training, competencies, skills, etc. These courses are to be chosen from a pool of courses designed to provide value-based and/or skill-based instruction.

## III PROGRAMME STRUCTURE:

The BCA programme is a three-year course of 160 credits divided into six-semesters. A student is required to complete 150 credits for the completion of course and the award of degree.

	Academic Year	Odd Semester	Credits	Even Semester	Credits
<b>Part – I</b>	First Year	Semester I	26	Semester II	26
<b>Part – II</b>	Second Year	Semester III	27	Semester IV	27
<b>Part – III</b>	Third Year	Semester V	27	Semester VI	27

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<b>Total Credits – 162</b>	80		82
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**Eligibility Criteria:** The detailed eligibility criteria for BCA programme for an academic session will be provided in the admission brochure. However, for quick reference, the eligibility criteria of BCA programme for academic session 2021-22 is as follows:

“Pass in 12th Class of 10+2 of CBSE or equivalent with a minimum of 50% marks in aggregate\* with pass in English (core or elective or functional). Mathematics or (Computer Science / Informatics Practice / Computer Applications / Multimedia & Web Technology / Data Management Application / Web Application as compulsory subject of non-vocational stream with 50 theory and 50 practical ratio). OR Three year Diploma in a branch of Engineering from a polytechnic duly approved by All India Council for Technical Education and affiliated to a recognized examining body with a minimum of 50% marks in aggregate.”

**Admission Criteria:** Admission shall be based on the merit of the written test /CET.

## IV INSTRUCTION FOR QUESTIONS PAPER SETTER:

- Question Paper setter for each course must refer the instructions provided with the detailed syllabus of the specific courses.
- The question paper shall be preferably set from the prescribed text books and reference books, mentioned in the syllabus.

## V CREDIT ALLOCATION (BCA PROGRAMME OF STUDY)

Course	Credits	
	Theory + Practical	Theory + Tutorial
	Core Course (6 credits) (12 papers)	Core Course (4 credits) (7 papers)
Core Course Theory 19 Papers	12x4=48	7x3=21
Core Course Practical / Tutorial* 19 Papers	12x2=24	7x1=7
Elective Course (4 Papers of 5 credits each, 5 Papers of 4 credits each and 7 Papers of 2 credits each)		
A.1. Discipline Specific Elective (4 Papers)	4x4 = 16	
A.2. Discipline Specific Elective Practical/Tutorial* (4 Papers)	1x4 = 04	
B.1. Generic Elective/ Interdisciplinary (2 Papers)		2x3 = 06
B.2. Generic Elective Practical/ Tutorial* (2 Papers)		2x1 = 02

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1.Ability Enhancement Compulsory Courses(AECC) (3 Papers of 4 credit each and 1 Paper of 6 Credit including Minor & Major Project)	$1 \times 4 + 1 \times 6 = 10$	$2 \times 4 = 8$
2. Ability Enhancement Compulsory Courses(AECC) (2 Papers of 2 credit)		$2 \times 2 = 04$
Skill Enhancement Courses (SEC) (5 Papers of 2 credit each)	$5 \times 2 = 10$	
Co-Curricular Activities	2	
<b>Total credit</b> 162	<b>114</b>	<b>48</b>

\*Wherever there is practical, there will be no tutorial and vice-versa

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## III. CBCS COURSE STRUCTURE FOR BCA PROGRAMME

### 1. SEMESTER WISE PLACEMENT OF THE COURSES

Semester	CORE COURSE (18)	Ability Enhancement Compulsory Course (AECC) (3)	Skill Enhancement Course (SEC) (2)	Elective: Discipline Specific (DSE) (5)	Elective: Generic (GE) (2)
<b>I</b>  <b>Total Credits 26</b>	CC1 (4) Discrete Mathematics	AECC 1 (4) Technical Communication			
	CC2 (4+2) Programming using 'C' Language				
	CC3(4+2) Fundamentals of IT & Computers				
	CC4 (4+2) Web Technologies				
<b>II</b>  <b>Total Credits 26</b>	CC5 (4) Applied Mathematics	AECC2 (2) Environment Studies	SEC -1 (2)		
	CC6 (4+2) Web Based Programming				
	CC7 (4+2) Data Structure And Algorithm Using 'C'				
	CC8 108 (4+2) Database Management System				
<b>III</b>  <b>Total Credits 27</b>	CC9 (4) Computer Network	AECC3 (2) Human Values and ethics	SEC -2 (2)	DSE- 1 (4+1)	Any course from the list GE-1(4)
	CC10 (4) Computer Organization and Architecture				
	CC11 (4+2) Object Oriented Programming with C++				
<b>IV</b>  <b>Total Credits 27</b>	CC12(4+2) Java Programming	AECC4 (4) Introduction to Management & Entrepreneurship Development	SEC-3 (2) Personality Development Skills	DSE -2 (4+1)	Any course from the list GE-2 (4)
	CC13 (4+2) Software Engineering				
<b>V</b>  <b>Total Credits</b>	CC14 (4+2) Operating System & Linux Programming	AECC 5 Minor Project (4)	SEC-4 (2) Summer Internship	DSE -3 (4+1)	
	CC15(4+2) Computer Graphics				



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<b>27</b>	CC 16 (4) Cloud computing				
<b>VI  Total Credits 29</b>	CC17 (4) Datawarehousing and Data Mining	AECC 6 Major Project (6)	SEC-5 (2) Seminar/ Conference Presentation	DSE -4 (4+1)	
	CC18 (4) E-Commerce				
	CC19 (4+2) Internet of Things				
	NSS / NCC / Cultural Clubs / Technical Society / Technical Clubs	Mandatory (2)			

## 1.1 Skill Enhancement Course 1(SEC)

**SEC 1 (choose one) Skill development course from the following**

- (i) MOOC course from SWAYAM / NPTEL of minimum 2 credits. Certificate is Mandatory for the degree
- (ii) Front End Design Tool VB.Net Lab
- (iii) Statistical Analysis using Excel
- (iv) Designing Lab Photoshop

## SEC 2 (choose one)

- (i) MOOC course From Swayam / NPTEL of minimum 2 credits. Certificate is Mandatory for the degree
- (ii) Designing Lab CorelDraw
- (iii) ASP.Net
- (iv) AR/VR

## 1.2 Discipline Specific Electives (DSE) (Choose any One Group of DSE)

### DSE-A – Data Science & Analytics

1. Basics of Python Programming
2. Introduction to Data Science
3. Data Visualization & Analytics
4. Machine Learning with Python

### DSE-B – Artificial Intelligence & Machine Learning

1. Basics of Python Programming
2. Introduction to Artificial Intelligence
3. Machine Learning with Python
4. Deep Learning with Python

### DSE-C– Cyber Security

1. Cyber Security
2. Network Security
3. Web Security
4. IT Acts and Cyber Laws

### DSE-D – Software Development

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1. Basics of Python Programming
2. Web Development with Python
3. Web Development with Java & JSP
4. Mobile Application Development

## 1.3 Generic Elective (GE) for BCA Students

### GE 1 (choose any One)

- (i) Principles of Management & Organizational Behaviour
- (ii) Any One Paper Offered as open elective by other School / Department / Programme

### GE 2 (choose any One)

- (i) Digital Marketing
- (ii) Principles of Accounting
- (iii) Any One Paper Offered as open elective by other School / Department / Programme

## 1.4 Generic (Open) Electives for other undergraduate programmes

The following Core courses of BCA programme may be offered as Generic Elective for other undergraduate programmes. Maximum number of students from other School / Department / Programme should not exceed 20% of total intake for the programme.

S.No.	Semester	Subject Code	Subject Name
1	I	BCA 105 BCA 173	Fundamentals of Computers & IT Practical – II IT Lab
2	I	BCA 107 BCA 175	Web Technologies Practical-III Web Tech Lab
3	II	BCA 108 BCA 176	Database Management System Practical – VI DBMS Lab
4	III	BCA 205 BCA 271	Object Oriented Programming using C++ Practical – VI C++ Lab
5	III	BCA 211	Basics of Python Programming
6	VI	BCA 304	E-Commerce

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## SEMESTER WISE EVALUATION SCHEME

Based on the above-mentioned course categories the semester wise Evaluation scheme of BCA Programme will be as follows:

### FIRST SEMESTER EXAMINATION

Code No.	Paper	Course Category	L	T/P	Credits	Marks Internal	Marks External	Max Marks
<b>Core Course Theory</b>								
BCA 101	Discrete Mathematics	Core Course Theory	3	1	4	25	75	100
BCA 103	Programming Using 'C' Language	Core Course Theory	3	1	4	25	75	100
BCA 105#	Fundamentals of Computers & IT	Core Course Theory	3	1	4	25	75	100
BCA 107#	Web Technologies	Core Course Theory	3	1	4	25	75	100
<b>Ability Enhancement Compulsory Course (AECC)</b>								
BCA 109	Technical Communication	AECC	3	1	4	25	75	100
<b>Core Course Practicals</b>								
BCA 171	Practical – I 'C' Prog. Lab	Core Course Practical	0	4	2	40	60	100
BCA 173#	Practical – II IT Lab	Core Course Practical	0	4	2	40	60	100
BCA 175#	Practical-III Web Tech Lab	Core Course Practical	0	4	2	40	60	100
<b>Bridge Course (Mandatory for Students from Non Mathematics background)</b>								
BCA 181 <sup>+</sup>	Bridge Course in Mathematics	Mandatory for Students from Non Mathematics background	2	0	0	Pass Grade	-----	-----
	<b>Total Credits</b>				<b>26</b>			<b>800</b>

<sup>+</sup> Non Credit subject mandatory for the students who do not have mathematics in 12<sup>th</sup> std.

The student has to obtain at least pass marks (40). The examination of this paper shall be conducted by the concerned teacher teaching the course / paper as Teacher's Continuous Evaluation for total 100 marks. Only the Pass / Fail status is to be specified on the marksheet of the examination and the result of the student. Passing is mandatory for student not having mathematics in 12<sup>th</sup> std.

# Generic Elective (GE) for other undergraduate programmes

**TOTAL MARKS: 800**

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## SEMESTER WISE EVALUATION SCHEME

### SECOND SEMESTER EXAMINATION

Code No.	Paper	Course Category	L	T/P	Credits	Marks Internal	Marks External	Max Marks
<b>Core Course Theory</b>								
BCA 102	Applied Mathematics	Core Course Theory	3	1	4	25	75	100
BCA 104	Web based Programming	Core Course Theory	3	1	4	25	75	100
BCA 106	Data Structure And Algorithm Using 'C'	Core Course Theory	3	1	4	25	75	100
BCA 108#	Database Management System	Core Course Theory	3	1	4	25	75	100
<b>Ability Enhancement Compulsory Course (AECC)</b>								
BCA 110	Environment Studies	AECC	2	0	2	25	75	100
<b>*Skill Enhancement Course (AEEC) (Choose any One)</b>								
BCA 132	**MOOC course from SWAYAM / NPTEL	SEC-1	0	0	2	100	0	100
BCA 134	Front End Design Tool VB.Net Lab	SEC-1	0	4	2	100	0	100
BCA 136	Statistical Analysis using Excel	SEC-1	0	4	2	100	0	100
BCA 138	Designing Lab Photoshop	SEC-1	0	4	2	100	0	100
<b>Core Course Practical</b>								
BCA 172	Practical-IV WBP Lab	Core Course Practical	0	4	2	40	60	100
BCA 174	Practical – V DS Lab	Core Course Practical	0	4	2	40	60	100
BCA 176#	Practical – VI DBMS Lab	Core Course Practical	0	4	2	40	60	100
	<b>Total</b>				<b>26</b>			<b>900</b>

\*NUES (Non – University Examination Subject) – Only Internal Assessment by the Institute)

# Generic Elective (GE) for other undergraduate programmes

**TOTAL MARKS: 900**

**\*\*Instructions for MOOC course**

- MOOC Course should be done from SWAYAM/NPTEL as per the guidelines of UGC.
- For securing the credits, the student is required to complete the assessment of the course and to provide the certificate of the course done from SWAYAM/NPTEL.

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3. The fees (if any) for the registration and/or assessment of the MOOC course must be borne by the student only.
4. If the student secures more than 2 credits for the MOOC Course even then 2 credits shall be considered for this subject and the grade/marks provided by assessing authority shall be transferred to the university by the institution where the student is studying. The University's Examination Division shall take the result of the MOOC course on record and a result declared for these papers. The student must submit the result of such papers to their respective institution. All the results for the MOOC courses may be submitted before the completion of other requirements including credits requirement.

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## SEMESTER WISE EVALUATION SCHEME

### THIRD SEMESTER EXAMINATION

Code No.	Paper	Course Type	L	T/P	Credits	Marks Internal	Marks External		Max Marks
							Th	Pr	
Core Course Theory									
BCA 201	Computer Network	Core Course Theory	3	1	4	25	75	0	100
BCA 203	Computer Organization and Architecture	Core Course Theory	3	1	4	25	75	0	100
BCA 205#	Object Oriented Programming with C++	Core Course Theory	3	1	4	25	75	0	100
Ability Enhancement Compulsory Course (AECC)									
BCA 207	Human Values and Ethics	AECC	2	0	2	25	75	0	100
*Discipline Specific Elective (Choose any One)									
BCA 211#	Basics of Python Programming	DSE-1	4	1	5	25	50	25	100
BCA 213	Cyber Security	DSE-1	4	1	5	25	50	25	100
**Generic Elective (Choose any One)									
BCA 221	Principles of Management & Organizational Behaviour	GE-1	3	1	4	25	75	0	100
BCA 223	Open Elective offered by other Department/School /programme	GE-1	3	1	4	25	75	0	100
***Skill Enhancement Course (AEEC) (Choose any One)									
BCA 231	****MOOC course from SWAYAM / NPTEL	SEC-2	0	0	2	100	0	0	100
BCA 233	Designing Lab CorelDraw	SEC-2	0	4	2	100	0	0	100
BCA 235	ASP.Net	SEC-2	0	4	2	100	0	0	100
BCA 237	AR/VR	SEC-2	0	4	2	100	0	0	100
BCA	Cyber Ethics	SEC-2	2	0	2	100	0	0	100

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239									
<b>Core Course Practical</b>									
BCA 271#	Practical – VII C++ Lab #	Core Course Practical	0	4	2	40	0	60	100
<b>Total</b>					<b>27</b>				<b>800</b>

# Generic Elective (GE) for other undergraduate programmes

\* First Subject from Discipline specific chosen group

\*\* Choose one subject from list of GE-1

\*\*\* NUES (Non – University Examination Subject) – Only Internal Assessment by the Institute) i.e. the assessment shall be conducted by the institution for all 100 marks as Teacher's Continuous Assessment

## \*\*\*\*Instructions for MOOC course

1. MOOC Course should be done from SWAYAM/NPTEL as per the guidelines of UGC.
2. For securing the credits, the student is required to complete the assessment of the course and to provide the certificate of the course done from SWAYAM/NPTEL.
3. The fees (if any) for the registration and/or assessment of the MOOC course must be borne by the student only.
4. If the student secures more than 2 credits for the MOOC Course even then 2 credits shall be considered for this subject and the grade/marks provided by assessing authority shall be transferred to the university by the institution where the student is studying. The University's Examination Division shall take the result of the MOOC course on record and a result declared for these papers. The student must submit the result of such papers to their respective institution. All the results for the MOOC courses may be submitted before the completion of other requirements including credits requirement.

**TOTAL MARKS: 800**

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## SEMESTER WISE EVALUATION SCHEME

### FOURTH SEMESTER EXAMINATION

Code No.	Paper	Course Type	L	T/P	Credits	Marks Internal	Marks External		Max Marks
							Th	Pr	
Core Course Theory									
BCA 202	Java Programming	Core Course Theory	3	1	4	25	75	0	100
BCA 204	Software Engineering	Core Course Theory	3	1	4	25	75	0	100
Ability Enhancement Compulsory Course (AECC)									
BCA 206	Introduction to Management & Entrepreneurship Development	AECC	3	1	4	25	75	0	100
*Discipline Specific Elective (Choose any One)									
BCA 212	Introduction to Data Science	DSE-2	4	1	5	25	50	25	100
BCA 214	Introduction to Artificial Intelligence	DSE-2	4	1	5	25	50	25	100
BCA 216	Network Security	DSE-2	4	1	5	25	50	25	100
BCA 218	Web Development Using Python and Django	DSE-2	4	1	5	25	50	25	100
**Generic Elective (Choose any One)									
BCA 222	Digital Marketing	GE-2	3	1	4	25	75	0	100
BCA 224	Principles of Accounting	GE-2	3	1	4	25	75	0	100
BCA 226	Open Elective offered by other Department/ School /programme	GE-2	3	1	4	25	75	0	100
***Skill Enhancement Course (AEEC)									
BCA 232	Personality Development Skills	SEC-3	2	0	2	100	0	0	100
Core Course Practical									
BCA 272	Practical – VIII Java Lab	Core Course Practical	0	4	2	40	0	60	100
BCA 274	Practical – IX SE Lab	Core Course Practical	0	4	2	40	0	60	100
	Total				27				800

\* Second Subject from Discipline specific chosen group

\*\* Choose one subject from list of GE-2



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**\*\*\* NUES (Non – University Examination Subject) – Only Internal Assessment by the Institute) i.e. the assessment shall be conducted by the institution for all 100 marks as Teacher's Continuous Assessment**

**Summer Training will be held for 4 weeks after the end of fourth semester.  
Viva-Voce will be conducted in fifth semester.**

**TOTAL MARKS: 800**

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## SEMESTER WISE EVALUATION SCHEME

### FIFTH SEMESTER EXAMINATION

Code No.	Paper	Course Type	L	T/P	Credits	Marks Internal	Marks External		Max Marks
							Th	Pr	
Core Course Theory									
BCA 301	Operating System & Linux Programming	Core Course Theory	3	1	4	25	75	0	100
BCA 303	Computer Graphics	Core Course Theory	3	1	4	25	75	0	100
BCA 305	Cloud Computing	Core Course Theory	3	1	4	25	75	0	100
Ability Enhancement Compulsory Course (AECC)									
BCA 307	Minor Project	AECC	0	8	4	40	0	60	100
*Discipline Specific Elective (Choose any One)									
BCA 311	Data Visualization & Analytics	DSE-3	4	1	5	25	50	25	100
BCA 313	Machine Learning with Python	DSE-3	4	1	5	25	50	25	100
BCA 315	Web Security	DSE-3	4	1	5	25	50	25	100
BCA 317	Web Development with Java & JSP	DSE-3	4	1	5	25	50	25	100
***Skill Enhancement Course (AEEC)									
BCA 331	Summer Training Project	SEC-4	0	0	2	100	0	0	100
Core Course Practical									
BCA 371	Practical – X Linux - OS Lab	Core Course Practical	0	4	2	40	0	60	100
BCA 373	Practical – XI CG Lab	Core Course Practical	0	4	2	40	0	60	100
	Total				27				800

\* Third Subject from Discipline specific chosen group

\*\*\*NUES (Non – University Examination Subject) – Only Internal Assessment by the Institute) i.e. the assessment shall be conducted by the institution for all 100 marks as Teacher's Continuous Assessment. Evaluation will be based on Summer Training held after fourth semester.

**TOTAL MARKS: 800**

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## SEMESTER WISE EVALUATION SCHEME

### SIXTH SEMESTER EXAMINATION

Code No.	Paper	Course Type	L	T/P	Cre dits	Marks Internal	Marks External		Max Mar ks
							Th	Pr	
Core Course Theory									
BCA 302	Data Ware Housing & Data Mining	Core Course Theory	3	1	4	25	75	0	100
BCA 304#	E- Commerce	Core Course Theory	3	1	4	25	75	0	100
BCA 306	Internet of Things	Core Course Theory	3	1	4	25	75	0	100
Ability Enhancement Compulsory Course (AECC)									
BCA 308	**Major Project	AECC	----	12	6	40	0	60	100
*Discipline Specific Elective (Choose any One)									
BCA 312	Machine Learning with Python	DSE-4	4	1	5	25	50	25	100
BCA 314	Deep Learning with Python	DSE-4	4	1	5	25	50	25	100
BCA 316	IT Act and Cyber Laws	DSE-4	4	1	5	25	75		100
BCA 318	Mobile Application Development	DSE-4	4	1	5	25	50	25	100
***Skill Enhancement Course (AEEC)									
BCA 332	Seminar/ Conference Presentation	SEC – 5	0	0	2	100	0	0	100
Core Course Practical									
BCA 372	Practical – XII IOT Lab	Core Course Practical	0	4	2	40	0	60	100
\$ BCA 374	NSS / NCC / Cultural Clubs / Technical Society / Technical Clubs	Mandatory	0	0	2	100	0	0	100
	Total				29				800

\*Fourth Subject from Discipline specific chosen group.

\*\* The student shall do the Major project in the Discipline Specific Area/Curriculum based subject /any emerging technology.

\*\*\* NUES (Non – University Examination Subject) – Only Internal Assessment by the Institute i.e. the assessment shall be conducted by the institution for all 100 marks as Teacher's Continuous Assessment .Evaluation will be based on the presentation on any latest

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technology/research article in in-house/external seminar/conference and will be conducted by the college committee only.

# **Generic Elective (GE) for other undergraduate programmes**

\$ **NUES (Non – University Examination Subject)** Comprehensive evaluation of the students by the concerned coordinator of NCC / NSS / Cultural Clubs / Technical Society / Technical Clubs out of 100 marks as per evaluation schemes worked out by these societies / organizations at the institution / University level. The coordinators shall be responsible for the evaluation of the same. These activities shall start from the 1<sup>st</sup> semester and evaluation shall be conducted at the end of 6<sup>th</sup> semester for the students admitted in the first semester.

**Note:** Any Elective Subject will be offered if minimum 1/3 rd of the total strength of students in the class will opt for it.

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Course Code: BCA 302

Course Name: Data Warehousing and Data Mining

L T C

3 1 4

## INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its sub parts, if any.
3. Examiners are requested to go through the Course Outcomes(CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy(BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

## LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:-

1. To understand the basic principles, concepts and applications of Data warehousing and ELT tools.
2. Differentiate Online Transaction Processing and Online Analytical processing
3. To understand the Data Mining Process, Technologies & Rules, platform tools and data pre-processing or data visualization techniques.
4. Identifying business applications of data mining
5. Develop skills in selecting the appropriate data mining algorithm for solving practical problems.

## PRE-REQUISITES:

1. Discrete Mathematics
2. Information system concept

## COURSE OUTCOMES (COs):

After completion of this course, the learners will be able to:-

CO #	Detailed Statement of the CO	*BT Level	Mapping to PO #
CO1	Understand the various component of Datawarehouse	BTL2	PO1, PO2, PO3, PO7,PO5
CO2	Appreciate the strengths and limitations of various data mining and data warehousing models	BTL3	PO1, PO2, PO3,PO7, PO10
CO3	Critically evaluate data quality to advocate application of data pre-processing techniques.	BTL3	PO1, PO2, PO3,PO4
CO4	Describe different methodologies used in data mining and data ware housing.	BTL4	PO1, PO2, PO3,PO4, PO7
CO5	Design a data mart or data warehouse for any organization	BTL5	PO1, PO2, PO3, PO4, PO11
CO6	Test real data sets using popular data mining tools such as WEKA	BTL6	PO1, PO2, PO3,PO4, PO6, PO7,PO8

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## UNIT – I

**No. of Hours:12**      **Chapter/Book Reference: TB3 [Chapters - 1, 2, 3]**

**Introduction to Data Warehousing:** Overview, Difference between Database System and Data Warehouse, The Compelling Need for data warehousing, Data warehouse – The building Blocks: Defining Features, data warehouses and data marts, overview of the components, three tier architecture, Metadata in the data warehouse.

**ETL tools:** - Defining the business requirements: Dimensional analysis, information packages – a new concept, requirements gathering methods, requirements definition: scope and content

## UNIT – II

**No. of Hours:11**      **Chapter/Book Reference: TB3 [Chapters - 10, 11, 12]**

**Principles of Dimensional Modeling:** Objectives, From Requirements to data design, Multi-Dimensional Data Model, Schemas: the STAR schema, the Snowflake schema, fact constellation schema.

**OLAP in the Data Warehouse:** Demand for Online Analytical Processing, limitations of other analysis methods, OLAP definitions and rules, OLAP characteristics, major features and functions, hyper cubes.

**OLAP Operations:** Drill-down and roll-up, slice-and-dice, pivot or rotation, OLAP models, overview of variations, the MOLAP model, the ROLAP model, the DOLAP model, ROLAP versus MOLAP, OLAP implementation considerations. Query and Reporting, Executive Information Systems (EIS), Data Warehouse and Business Strategy

## UNIT – III

**No. of Hours:10**      **Chapter/Book Reference: TB1 [Chapters: 1, 3], TB2 [Chapter - 3], RB5 [Chapter - 17]**

**Data mining and data pre-processing:**

**Data mining:** Introduction, What kind of data can be mined, What kind of patterns to be mined, Which technologies are used, What kinds of applications are targeted, Major issues in data mining.

**Data pre-processing:** Overview of Data pre-processing, data cleaning, data integration, data reduction, data transformation and data discretization, exploring data using IRIS datasets. Introduction to apriori algorithm for association mining rule.

## UNIT – IV

**No. of Hours: 10**      **Chapter/Book Reference: TB1[Chapters - 1, 3], RB2, RB3**

**Data mining applications, and Data mining Tools:**

**Applications of data mining:** Data mining for retail and telecommunication industries, data mining and recommender systems.

**Introduction to data mining tools (open source):** Weka, RapidMiner, IBM Watson for classification and clustering algorithms using IRIS Datasets

### TEXT BOOKS:

**TB1.** Kamber and Han, “Data Mining Concepts and Techniques”, Third edition, Hartcourt India P.Ltd.,2012.

**TB2.** Pang-Ning Tan, Michael Steinbach, Vipin Kumar, “Introduction to data mining”, Pearson

# Bachelor of Computer Applications

education, 2006

**TB3.** Paul Raj Poonia, “Fundamentals of Data Warehousing”, John Wiley & Sons, 2004

## **REFERENCE BOOKS:**

**RB1.** Ashok N. Srivastava, Mehran Sahami, “Text Mining Classification, Clustering, and Applications”, Published by Chapman and Hall/CRC1<sup>st</sup> Edition, June 23, 2009

**RB2.** Ian H., Eibe Frank, Mark A. Hall, Christopher Pal “Data Mining: Practical Machine Learning Tools and Techniques”Published by Morgan Kaufmann; 4th edition ,December 1, 2016

**RB3.** G. K. Gupta, “Introduction to Data Mining with Case Studies”, PHI, 2006

**RB4.** Alex Berson and Stephen J.Smith, “Data Warehousing, Data Mining & OLAP”, Tata McGraw Hill, 1 July 2017

**RB5.** Shmueli, “Data Mining for Business Intelligence : Concepts, Techniques and Applications in Microsoft Excel with XLMiner”,Wiley Publications

# Bachelor of Computer Applications

Course Code: BCA 304  
Course Name: E-Commerce

L T C  
3 1 4

## INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its sub parts, if any.
3. Examiners are requested to go through the Course Outcomes(CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy(BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

## LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following: -

1. To learn and understand the basic nature of e-commerce.
2. To study how the internet and web support e-commerce.
3. To explain how to use technologies to build e-commerce websites.
4. To make students aware of the business environment associated with e-commerce.

## PRE-REQUISITES:

1. Basic Knowledge of computers and business concepts.
2. Basic knowledge of the Internet.

## COURSE OUTCOMES(COs):

After completion of this course, the learners will be able to: -

CO#	Detailed Statement of the CO	*BT Level	Mapping to PO #
CO1	Understand the framework and business models of E-commerce.	BTL2	PO1, PO2, PO3, PO7
CO2	Explain the concept of network infrastructure and gain knowledge about mobile commerce.	BTL2	PO1, PO2, PO3, PO7, PO10
CO3	Demonstrate the process of secure electronic transactions for E-commerce.	BTL3	PO1, PO2, PO3, PO4
CO4	Analyze various e-commerce secure payment gateway.	BTL4	PO1, PO2, PO3, PO4, PO7
CO5	Evaluate Internet banking platform to work with E-commerce infrastructure.	BTL5	PO1, PO2, PO3, PO4, PO11
CO6	Implement ecommerce website for online business.	BTL6	PO1, PO2, PO3, PO4, PO6, PO7, PO8



# Bachelor of Computer Applications

## UNIT-I

**No. of Hours: 10**      **Chapter/Book Reference: TB1[Chapters – 1,2],**

**Introduction:** Definition of Electronic Commerce, Evolution of e-commerce, E-Commerce & E Business, Unique features of e-commerce, Types of e-commerce: B2B, B2C, C2C, M-commerce, Social Commerce advantages and disadvantages

**E-commerce infrastructure:** Technological building blocks: Internet, web and mobile applications

## UNIT II

**No. of Hours: 10**      **Chapter/Book Reference: TB1 [Chapters - 2, 3], RB1, RB3**

**Building an e-commerce presence:** Planning, System Analysis, Design, Choosing Software, Hardware, Other E-commerce site tools: Tools For website design, Tools for SEO, Interactivity and active contents (Server side scripting)

Important Components of E-commerce website: Product Cataloging Product Listing Page, Product description Page, Cart building and Checkout, Third party integrations: Payment systems, Data Layer Integrations for analytics, Customer support integration, Order tracking, Shipping, return and cancellation

New Technologies for E-commerce: Chatbots, Recommendation systems (Personalisation), Smart Search, Product Comparison, Augmented reality, Big data, Cloud computing

## UNIT III

**No. of Hours: 10**      **Chapter/Book Reference: TB2 [Chapters - 5, 6, 7], RB1, RB3**

**Electronic Payment Systems-**

Overview of Electronics payments, electronic Fund Transfer, Digital Token based Electronics payment System, Smart Cards, Credit Cards, Debit Cards, Emerging financial Instruments Smartphone wallet, Social / Mobile Peer to Peer Payment systems, Digital Cash and Virtual Currencies, Online Banking, Payment Gateway, Electronic Billing Presentment and Payment.

## UNIT IV

**No. of Hours: 10**      **Chapter/Book Reference: TB1[Chapters - 5, 6, 7], RB4**

**Security Threats and Issues:** Cyber crimes, Credit card frauds/theft, Identity fraud, spoofing , sniffing, DOS and DDOS attacks, Social network security Issues, Mobile Platform Security issues, Cloud security issues

**Technology Solutions:** Encryption : Secret Key Encryption, Public Key Encryption, Digital Certificates and public key infrastructure

**Securing channels:** Secured Socket Layer (SSL), Transport Layer Security(TLS) , Virtual Private Network (VPN ), Protecting Networks: Firewalls, Proxy Servers, Intrusion detection and protection systems , Anti Virus software

## TEXT BOOKS:

**TB1.** Kenneth C. Laudon, “E-Commerce: Business, Technology and Society”, 15th Edition, Pearson education

**TB2.** KK Bajaj & Debjani Nag,” E-Commerce: The Cutting Edge of Business “McGraw Hill, II edition, 2015

**TB3.** Efraim Turban, Jae Lee, David King, H. Michael Chung, “Electronic Commerce – A Managerial Perspective”, Addison-Wesley.

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## REFERENCE BOOKS:

- RB1.** The Complete Reference: Internet, Margaret Levine Young, Tata McGraw Hill.  
**RB2.** E-Commerce: Concepts, Models, Strategies, CSV Murthy, Himalayas Publishing House.  
**RB3.** Frontiers of Electronic Commerce, Ravi Kalakota & Andrew B. Wilson, Addison-Wesley (An Imprint of Pearson Education).  
**RB4.** Network Security Essentials: Applications & Standards, William Stallings, Pearson Education.

**Course Code: BCA 306**

**Course Name: Internet of Things**

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## INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its sub parts, if any.
3. Examiners are requested to go through the Course Outcomes(CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy(BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

## LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:

1. To learn and understand the concept of Internet of Things (IOT).
2. To study the constituent components of Internet of Things.
3. To design and develop IoT applications using different, Sensors/actuators.
4. To seek working knowledge of Arduino, Raspberry pi Boards and to develop cloud based IOT projects.

## PRE-REQUISITES:

1. Basic Programming Knowledge
2. Use of Internet

## COURSE OUTCOMES (COs):

After completion of this course, the learners will be able to:-

CO#	Detailed Statement of the CO	*BT Level	Mapping to PO #
CO1	Understand the architecture and the functional blocks of Internet of Things.	BTL2	PO1, PO2, PO3
CO2	Explain the concepts of Internet of Things and gain knowledge to design IoT applications	BTL2	PO1, PO2, PO3,PO7, PO10
CO3	Demonstrate the process of capturing and analyzing data in Internet of Things.	BTL3	PO1, PO2, PO3,PO4
CO4	Examine the various components involved in IoT design methodology.	BTL4	PO1, PO2, PO3,PO4,PO7

# Bachelor of Computer Applications

CO5	Evaluate an IoT device to work with a Cloud Computing infrastructure.	BTL5	PO1,PO2,PO3, PO4,PO11
CO6	Implement IoT protocols for communication.	BTL6	PO1,PO2, PO3,PO4, PO6, PO7,PO8

# Bachelor of Computer Applications

## UNIT-I

**No. of Hours: 10** Chapter/Book Reference: TB1 [Chapters - 1,3,4,6]; TB2[Chapters - 1,2,3]

**Internet of Things (IoT):** Vision, Definition, Conceptual framework, Architectural view, Technology behind IoT, Sources of the IoT, M2M Communication, IoT examples.

**Design Principles for Connected Devices:** IoT/M2M systems layers and design standardization, Communication technologies, Data enrichment and consolidation, Ease of designing and affordability.

## UNIT-II

**No. of Hours: 10** Chapter/Book Reference: TB1 [Chapters - 4,7,8,11], TB2 [Chapters - 4,5,7,9], TB4[Chapters - 2,4,5,6,9]

**Hardware for IoT:** Sensors, Digital sensors, Actuators, Radio frequency identification (RFID) technology, Wireless sensor networks, Participatory sensing technology.

**Embedded Platforms for IoT:** Embedded computing basics, Overview of IOT supported hardware platforms such as Arduino, NetArduino, Raspberry Pi, Beagle Bone, Intel Galileo boards and ARM cortex.

## UNIT-III

**No. of Hours: 11** Chapter/Book Reference: TB1 [Chapters - 1,3,4,], TB2 [Chapters - 2,3,6], TB4 [Chapter - 7]

**Network & Communication Aspects in IoT:** Wireless medium access issues, MAC protocol survey, Survey routing protocols, Sensor deployment & Node discovery, Data aggregation & dissemination

**Programming the Arduino:** Arduino platform boards anatomy, Arduino IDE, Coding using emulator, Using libraries, Additions in Arduino, Programming the Arduino for IoT.

## UNIT-IV

**No. of Hours: 11** Chapter/Book Reference: TB1 [Chapters - 15,16], TB3[Chapters - 13, 14, 15, 16, 17], RB1[Chapter - 4]

**Challenges in IoT Design Challenges:** Development challenges, Security challenges, Other challenges.

**IoT Applications:** Smart metering, E-health, City automation, Automotive applications, Home automation, Smart cards, Communicating data with H/W units, Mobiles, Tablets, Designing of smart street lights in smart city.

### TEXT BOOKS:

**TB1.** Olivier Hersent, David Boswarthick, Omar Elloumi, “The Internet of Things Key Applications and Protocols”, Wiley.

**TB2.** Jeeva Jose, “Internet of Things”, Khanna Publishing House.

**TB3.** Michael Miller, “The Internet of Things”, Pearson Education.

**TB4.** Raj Kamal, “Internet of Things”, McGraw-Hill, 1<sup>st</sup> Edition, 2016

**TB5.** Adrian McEwen, Hakin Cassimally, “Designing the Internet of Things”, Wiley India

### REFERENCE BOOKS:

**RB1.** Arshdeep Bahgaand Vijay Madiseti, "Internet of Things: A Hands-on Approach", University Press, 2015

**RB2.** Pethuru Raj and Anupama C. Raman, “The Internet of Things: Enabling Technologies, Platforms, and Use Cases”, CRC Press, 2017.

# Bachelor of Computer Applications

**Course Code: BCA 308**  
**Course Name: Major Project**

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## PROJECT REPORT

**All the students are required to submit a report based on the project work done by them during the sixth semester.**

### SYNOPSIS (SUMMARY/ABSTRACT) :

All students must submit a summary/abstract separately with the project report. Summary, preferably, should be of about 3-4 pages. The content should be as brief as is sufficient enough to explain the objective and implementation of the project that the candidate is going to take up. The write up must adhere to the guidelines and should include the following:

- Name / Title of the Project
- Statement about the Problem
- Why is the particular topic chosen?
- Objective and scope of the Project
- Methodology (including a summary of the project)
- Hardware & Software to be used
- Testing Technologies used
- What contribution would the project make?

**TOPIC OF THE PROJECT-** This should be explicitly mentioned at the beginning of the Synopsis. Since the topic itself gives a peep into the project to be taken up, candidate is advised to be prudent on naming the project. This being the overall impression on the future work, the topic should corroborate the work.

**OBJECTIVE AND SCOPE:** This should give a clear picture of the project. Objective should be clearly specified. What the project ends up to and in what way this is going to help the end user has to be mentioned.

**PROCESS DISCRPTION:** The process of the whole software system proposed, to be developed, should be mentioned in brief. This may be supported by DFDs / Flowcharts to explain the flow of the information.

**RESOURCES AND LIMITATIONS:** The requirement of the resources for designing and developing the proposed system must be given. The resources might be in form of the hardware/software or the data from the industry. The limitation of the proposed system in respect of a larger and comprehensive system must be given.

**CONCLUSION:** The write-up must end with the concluding remarks- briefly describing innovation in the approach for implementing the Project, main achievements and also any other important feature that makes the system stand out from the rest.

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## **The following suggested guidelines must be followed in preparing the Final Project Report:**

Good quality white A4 size paper should be used for typing and duplication. Care should be taken to avoid smudging while duplicating the copies.

Page Specification: (Written paper and source code)

- Left margin - 3.0 cms
- Right margin- 2.0 cms
- Top margin 2.54 cms
- Bottom margin 2.54 cms
- Page numbers - All text pages as well as Program source code listing should be numbered at the bottom center of the pages.

**Normal Body Text: Font Size:** 12, Times New Roman, Double Spacing, Justified. 6 point above and below para spacing

**Paragraph Heading Font Size:** 14, Times New Roman, Underlined, Left Aligned. 12 point above & below spacing.

**Chapter Heading Font Size:** 20, Times New Roman, Centre Aligned, 30 point above and below spacing. **Coding Font size :** 10, Courier New, Normal

**Submission of Project Report to the University :** The student will submit his/her project report in the prescribed format. The Project Report should include:

4. One copy of the summary/abstract.
5. One hard Copy of the Project Report.
6. The Project Report may be about 75 pages (excluding coding).

## **FORMAT OF THE STUDENT PROJECT REPORT ON COMPLETION OF THE PROJECT**

- IX. Cover Page as per format
- X. Acknowledgement
- XI. Certificate of the project guide
- XII. Synopsis of the Project
- XIII. Main Report
  - vii. Objective & Scope of the Project
  - viii. Theoretical Background Definition of Problem
  - ix. System Analysis & Design vis-a-vis User Requirements
  - x. System Planning (PERT Chart)
  - xi. Methodology adopted, System Implementation & Details of Hardware & Software used System Maintenance & Evaluation
  - xii. Detailed Life Cycle of the Project
    - f. ERD, DFD
    - g. Input and Output Screen Design
    - h. Process involved
    - i. Methodology used testing

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- j. Test Report, Printout of the Report & Code Sheet
- XIV. Coding and Screenshots of the project
- XV. Conclusion and Future Scope
- XVI. References

## **Formats of various certificates and formatting styles are as:**

### **5. Certificate from the Guide**

#### **CERTIFICATE**

This is to certify that this project entitled “ xxxxxx xxxxxx xxxxxx xxxxxx xxxxxx xxx” submitted in partial fulfillment of the degree of Bachelor of Computer Applications to the “xx” through xxxxxx xxxxxx done by Mr./Ms.\_\_\_\_\_, Roll No. \_\_\_\_\_ is an authentic work carried out by him/her at \_\_\_\_\_ under my guidance. The matter embodied in this project work has not been submitted earlier for award of any degree to the best of my knowledge and belief.

Signature of the student

Signature of the Guide

### **6. Project Report Cover Page Format:**

**Title of the Project/report**  
(Times New Roman, Italic, Font size = 24 )

**Submitted in partial fulfilment of the requirements for the award of the  
degree of  
Bachelor of Computer Applications  
(Bookman Old Style, 16 point, centre)**

**Submitted to:  
(Guide Name)**

**Submitted by:  
(Student's name)  
Roll No  
College Name**

### **7. Self-Certificate by the students**

#### **SELF CERTIFICATE**

This \_\_\_\_\_ is to certify that the dissertation/project report entitled “.....” is done by me is an authentic work carried out for the partial fulfilment of the requirements for the award of the degree of Bachelor of Computer Applications

# **Bachelor of Computer Applications**

under the guidance of \_\_\_\_\_. The matter embodied in this project work has not been submitted earlier for award of any degree or diploma to the best of my knowledge and belief.

Signature of the student

Name of the Student

Roll No.

## **8. ACKNOWLEDGEMENTS**

In the “Acknowledgements” page, the writer recognizes his indebtedness for guidance and assistance of the thesis adviser and other members of the faculty. Courtesy demands that he also recognize specific contributions by other persons or institutions such as libraries and research foundations. Acknowledgements should be expressed simply, tastefully, and tactfully.



# Bachelor of Computer Applications

Course Code: BCA 312

Course Name: Machine Learning with Python

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## INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its sub parts, if any.
3. Examiners are requested to go through the Course Outcomes(CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy(BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

## LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:

1. To make student able to learn mathematical concepts, and algorithms used in machine learning techniques for solving real world problems and developing new applications based on machine learning.
2. To introduce students to the state-of-the-art concepts and techniques of Machine Learning using Python.

## PRE-REQUISITES:

Basics of Python Programming

## COURSE OUTCOMES(COs):

After completion of this course, the learners will be able to: -

CO#	Detailed Statement of the CO	*BT Level	Mapping to PO #
CO1	Explain machine learning concepts on real world applications and problems.	BTL2	PO2
CO2	Analyze and Implement Regression techniques.	BTL3	PO3, PO4
CO3	Solve and design solution of Classification problem	BTL4	PO3, PO4
CO4	Understand and implement Unsupervised learning algorithms	BTL5	PO4, PO6
CO5	Interpret various machine learning algorithms in a range of real-world applications.	BTL6	PO2, PO6, PO7, PO8

## UNIT-I

No. of Hours: 11 Chapter / Book Reference: TB1 [Chapters - 1, 3, 4, 8, 9], TB2 [Chapters - 1, 4]

Introduction to Machine Learning, Why Machine learning, Types of Machine Learning Problems, Applications of Machine Learning. Supervised Machine Learning- Regression and Classification. Binary Classifier, Multiclass Classification, Multilabel Classification. Performance Measures-

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Confusion Matrix, Accuracy, Precision & recall, ROC Curve. Advanced Python- NumPy, Pandas. Python Machine Learning Library Scikit-Learn, Linear Regression with one Variable, Linear Regression with Multiple Variables, Logistic Regression.

## UNIT-II

**No. of Hours: 11**      **Chapter / Book Reference: TB1 [Chapter - 5, 6, 7], TB2 [Chapter - 6]**

Supervised learning Algorithms: Decision Trees, Tree pruning, Rule based Classification, Naïve Bayes, Bayesian Network, Support Vector Machines, k-Nearest Neighbor, Ensemble Learning and Random Forest algorithm.

## UNIT – III

**No. of Hours: 11**      **Chapter / Book Reference: TB1 [Chapter - 10], TB3 [Chapters - 2, 6]**

Artificial Neural Networks, HebbNet, Perceptron, Adaline, Multilayer Neural Network, Architecture, Activation Functions, Loss Function, Hyperparameters, Gradient Descent, Backpropagation, Variants of Backpropagation, Avoiding overfitting through Regularization, Applications of Neural Networks.

## UNIT – IV

**No. of Hours: 11**      **Chapter/Book Reference: TB1[Chapter - 8], TB2 [Chapter - 7], TB3 [Chapter - 4]**

Unsupervised learning algorithms: Introduction to Clustering, k-means Clustering, k-medoids clustering, Hierarchical Clustering, Kohonen Self-Organizing Maps. Implementation of Unsupervised algorithms. Feature selection and Dimensionality reduction, Principal Component Analysis.

### TEXT BOOKS:

**TB1.** Geron Aurelien, “Hands-On Machine Learning with Scikit-Learn & TensorFlow”, O’REILLY, First Edition, 2017.

**TB2.** U Dinesh Kumar and Manaranjan Pradhan, “Machine Learning using Python”, Wiley, 2019.

**TB3.** Fausett Laurence, “Fundamentals of Neural Networks”, Pearson, Ninth Edition, 2012.

### REFERENCE BOOKS:

**RB1.** Tom Mitchell, “Machine Learning”, First Edition, McGraw- Hill, 1997.

**RB2.** Budd T A, "Exploring Python", McGraw-Hill Education, 1<sup>st</sup> Edition, 2011.

**RB3.** Jake Vander Plas, “Python Data Science Handbook”, O’Reilly, 1st edition, 2017.

### List of Practicals

S. No.	Detailed Statement	Mapping to CO#
1.	Extract the data from the database using python.	
2.	Write a program to implement linear and logistic regression.	
3.	Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .csv file. Compute the accuracy of the classifier, considering few test data sets.	
4.	Write a program to implement k-nearest neighbors (KNN) and Support Vector Machine (SVM) Algorithm for classification.	

# Bachelor of Computer Applications

5.	Implement classification of a given dataset using random forest.	
6.	Build an Artificial Neural Network (ANN) by implementing the Back propagation algorithm and test the same using appropriate data sets.	
7.	Apply k-Means algorithm to cluster a set of data stored in a .csv file. Use the same dataset for clustering using the k-Medoids algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Python ML library classes in the program.	
8.	Write a program to implement Self - Organizing Map (SOM)	
9.	Write a program for empirical comparison of different supervised learning algorithms	
10.	Write a program for empirical comparison of different unsupervised learning algorithms	
<b>Note:</b> <b>1. In total 10 practicals to be implemented. 2 additional practical may be given by the course instructor.</b> <b>2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.</b>		

# Bachelor of Computer Applications

Course Code: BCA 314

Course Name: Deep Learning with Python

L T C

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## INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its sub parts, if any.
3. Examiners are requested to go through the Course Outcomes(CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy(BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

## LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:-

1. To present the mathematical, statistical and computational challenges of building neural networks
2. To study the concepts of deep learning and important deep learning techniques
3. To introduce important Deep Learning architectures
4. To enable the students to apply deep learning techniques to support real-life applications

## PRE-REQUISITES:

Basics of Python Programming

## COURSE OUTCOMES (COs):

After completion of this course, the learners will be able to:-

CO#	Detailed Statement of the CO	*BT Level	Mapping to PO #
CO1	Understand the basic concepts of Deep Learning and differentiate between shallow learning and deep learning.	BTL2	PO1, PO2, PO6
CO2	Implement various Deep Learning Models.	BTL3	PO2, PO3, PO4, PO8
CO3	Understand different Deep Learning architectures and training algorithms.	BTL3	PO1, PO2, PO3, PO5, PO8
CO4	Understanding Dimensionality Reduction and optimization in Deep Learning.	BTL4	PO1, PO2, PO3, PO4
CO5	Understanding and implementing Recurrent Neural Network (RNN).27	BTL3	PO1, PO2, PO3, PO8
CO6	Applying Deep Learning techniques in real life applications such as object detection and analysis.	BTL6	PO2, PO3, PO4, PO5, PO6, PO8

# Bachelor of Computer Applications

## UNIT-I

**No. of Hours:11** Chapter/Book Reference: TB1 [Chapters - 1, 2], TB2 [Chapter - 2], TB3 [Chapters - 3, 5]

Introduction – Overview of Machine Learning, Introduction to Artificial Neural Network (ANN), Perceptron, Training a Neural Network, Activation Functions, Loss Function, Hyperparameters, Gradient Descent, Stochastic Gradient Descent, Backpropagation and regularization, Batch normalization, Building an ANN in Python, Frameworks-TensorFlow, Keras.

## UNIT-II

**No. of Hours:12** Chapter/Book Reference: TB1 [Chapters - 3, 4, 5, 6], TB2 [Chapters - 3,4,5], TB3[Chapters - 7, 8]

What is Deep Learning? Deep vs Shallow Networks, Convolution Neural Networks (CNN) – Convolution Layers, Pooling Layer, Flattening, FullyConnected Layers, Softmax and Cross-Entropy, Building a CNN in Python, Fully Connected CNN, CNN Architectures – LeNet, AlexNet, ZFNet, GoogLeNet, VGGNet, ResNet, DenseNet, Training a Convnet: weights initialization, batch normalization, hyperparameter optimization

## UNIT-III

**No. of Hours:11** Chapter/Book Reference: TB1 [Chapters - 3, 4, 7]

Deep Belief Networks, Auto Encoders, Concept of Dimensionality Reduction, Autoencoder, Denoising Autoencoders, Deep Autoencoders, Concept of Reinforcement Learning

## UNIT-IV

**No. of Hours: 11** Chapter/Book Reference: TB2 [Chapter - 7]; TB3 [Chapter - 9]

Recurrent Neural Networks (RNN), LSTM, Sequence Prediction and Time Series Forecasting with LSTM, Overview of Object Detection Techniques using Deep Learning, Overview of Transfer Learning.

## TEXT BOOKS:

**TB1.** Adam Gibson and Josh Patterson, Deep Learning: A Practitioner's Approach, (O'Reilly).

**TB2.** Mohamed Elgendy, Deep Learning for Vision Systems, Manning Publications, ISBN: 9781617296192

**TB3.** Navin Kumar Manaswi, Deep Learning with Applications Using Python, Apress (2018)

## REFERENCE BOOKS:

**RB1.** Cosma Rohilla Shalizi, Advanced Data Analysis from an Elementary Point of View, 2015.

**RB2.** Deng & Yu, Deep Learning: Methods and Applications, Now Publishers, 2013.

**RB3.** Ian Goodfellow, Yoshua Bengio, Aaron Courville, Deep Learning, MIT Press, 2016.

**RB4.** Michael Nielsen, Neural Networks and Deep Learning, Determination Press, 2015.

**RB5.** Charu C. Aggarwal, Neural Networks and Deep Learning, Springer, 2018.

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**RB6.** M. Arif Wani, Farooq Ahmad Bhat, Saduf Afzal, Asif Iqbal Khan, Advances in Deep Learning, Springer, 2020.

## List of Practical

S.No.	Detailed Statement	Mapping to CO#
1.	Write a program for creating a perceptron.	C01
2.	Write a program to implement multi-layer perceptron using TensorFlow. Apply multi-layer perceptron (MLP) on the Iris dataset.	C01
3.	(a) Write a program to implement a Convolution Neural Network (CNN) in Keras. Perform predictions using the trained Convolution Neural Network (CNN). (b) Write a program to build an Image Classifier with CIFAR-10 Data.	C05
4.	(a) Write a program to perform face detection using CNN. (b) Write a program to demonstrate hyperparameter tuning in CNN. (c) Predicting Bike-Sharing Patterns – Build and train neural networks from scratch to predict the number of bike share users on a given day.	C05
5.	Write a program to build auto-encoder in Keras.	C02, C03
6.	Write a program to implement basic reinforcement learning algorithm to teach a bot to reach its destination.	C03
7.	(a) Write a program to implement a Recurrent Neural Network (b) Write a program to implement LSTM and perform time series analysis using LSTM.	C05
8.	(a) Write a program to perform object detection using Deep Learning (b) Dog-Breed Classifier – Design and train a convolutional neural network to analyze images of dogs and correctly identify their breeds. Use transfer learning and well-known architectures to improve this model.	C02, C04
9.	(a) Write a program to demonstrate different activation functions. (b) Write a program in TensorFlow to demonstrate different Loss functions.	C02
10.	Write a program to build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets	C05
<b>Note:</b> <b>1. In total 10 practicals to be implemented. 2 additional practical may be given by the course instructor.</b> <b>2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.</b>		

# Bachelor of Computer Applications

**Course Code: BCA 316**

**Course Name: IT Act and Cyber Laws**

**L T C**

**4 1 5**

## **INSTRUCTIONS TO PAPER SETTERS:**

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

## **LEARNING OBJECTIVES:**

In this course, the learners will be able to develop expertise related to the following:

1. Students will be able to have the basic clarity and understanding of cybercrimes and cyber security laws
2. Students will be able to understand the need for cyber laws, will be able to describe and differentiate between substantive, procedural, and preventive cybercrime laws.
3. To understand and critically assess national, regional, and international cybercrime laws.
4. To create awareness among the students about how crime being is committed in the cyber world.

## **PRE-REQUISITES:**

None

## **COURSE OUTCOMES (COs):**

After completion of this course, the learners will be able to: -

<b>CO #</b>	<b>Detailed Statement of the CO</b>	<b>*BT Level</b>	<b>Mapping to PO #</b>
CO1	Define various Cyber laws in the world, Classification of Cybercrime	BTL1	PO1, PO7
CO2	Describe and explain the ways in which certain cybercrimes are perpetrated.	BTL2	PO3
CO3	Explain and use the objectives of national cyber security strategies.	BTL2 BTL3	PO3, PO7
CO4	Discover IPR and E-commerce law.	BTL4	PO2
CO5	Explain and Evaluate E-Commerce Issues and provisions in Indian Law.	BTL5	PO3, PO4

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CO6	Design and create frameworks for international cooperation on cyber security Matters.	BTL6	PO4, PO6
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## UNIT I

**No. of Hours:14**      **Chapter/Book Reference: TB5 [Chapter - 1], RB2 [Chapters - 1, 2], RB3 [Chapters - 1, 3]**

**Introduction to the Cyber World and Cyber Law:** Cyber World: An Overview, The internet and online resources, Introduction to Computer Crimes and Cyber Crimes, Distinction between cybercrimes and conventional crimes, Reasons for commission of cyber-crime, Cyber forensic. Classification of cyber-crimes: Cyber criminals and their objectives, Planning of attacks. Types of cybercrimes: Cyber Stalking; Forgery and Fraud, Social engineering attacks, Phishing, DoS and DDoS attacks, Identity Theft, Salami Attack, Net Extortion. Introduction to Cyberspace: Cybercrime, Threats to the virtual world, Cyber Crimes & Social Media attacks, Cyber Squatting, Cyber Espionage, Cyber Warfare, Cyber Terrorism, Cyber Defamation, Crime related to IPRs, Computer Vandalism etc. Access and Unauthorized Access, Data Security, E-Contracts and E-Forms

## UNIT II

**No. of Hours: 14**      **Chapter/Book Reference: TB1 [Chapter - 1], RB2 [Chapter - 2]**

Introduction to Cyber Law, Need for Cyber Law  
Evolution of the IT Act, Genesis and Necessity - Salient features of the IT Act, 2000, Various authorities under IT Act and their powers, Penalties & Offences, Amendments.  
Impact on other related Acts (Amendments) - Amendments to Indian Penal Code, Indian Evidence Act, Bankers Book Evidence Act, Reserve Bank of India Act - Cyberspace Jurisdiction.  
Online Safety for all with special reference for women and children, Misuse of individual information. Violation of privacy, Trafficking of Information and Data

## UNIT-III

**No. of Hours: 10**      **Chapter/Book Reference: TB1 [Chapter - 4], RB2 [Chapter - 7]**

E-Commerce and Laws in India: Digital/Electronic Signature in Indian Laws, Digital Certificates, Certifying Authority, E-Commerce Issues and provisions in Indian Laws, Concept of E-Governance and its Implication in India, Issues related to E-Taxation in Cyberspace, E-Contracts and its validity in India (f) Cyber Tribunal & Appellate Tribunal.

## UNIT-IV

**No. of Hours: 12**      **Chapter/Book Reference: TB1 [Chapter - 2], RB2 [Chapters - 4, 5]**



# Bachelor of Computer Applications

Intellectual Property Rights - Domain Names and Trademark Disputes, Concept of Trademarks in Internet Era, Cyber Squatting, Reverse Hijacking Jurisdiction in Trademark Disputes, Copyright in the Digital Medium, Copyright in Computer Programmes.

Cyber Laws in India – Crime against Individual, Crime against Property, Crime against Nation, Indian Case Laws, An introduction to International Cyber Laws

## **TEXT BOOKS:**

**TB1.** Cyber Laws and IT Protection: Harish Chandra, PHI Learning

**TB2.** Sharma J. P, & Kanojia S. (2016). Cyber Laws. New Delhi: Ane Books Pvt. Ltd.

**TB3.** Duggal, P. Cyber Laws. (2016) Universal Law Publishing.

**TB4.** Kamath, N. (2004). Law relating to computers, internet and e-commerce: A guide to Cyber Laws and the Information Technology Act, 2000 with rules, regulations and notifications (2nd ed.). Delhi: Universal Law Publishing Co.

**TB5.** Cyber security: Nina Godbole, Wiley Publication 2016

## **REFERENCE BOOKS:**

**RB1.** Baase, S. (2013). A Gift of Fire: Social, Legal, and Ethical Issues for Computing

**RB2.** Cyber Law Simplifies: Vivek Sood, McGraw Hill Publication

**RB3.** Introduction to Cyber Security: Anand Shinde

**RB4.** Technology (4th ed.) Upper Saddle River, NJ: Pearson Education.

# Bachelor of Computer Applications

Course Code: BCA-318

Course Name: Mobile Application Development

L T C

4 1 5

## INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

## LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:-

1. Identify various concepts of mobile application programming that make it unique from programming for other platforms.
2. To help learner to gain a basic understanding of Android application development.
3. Program mobile applications for the Android operating system that use basic and advanced phone features, and deploy applications to the Android marketplace for distribution.

## PRE-REQUISITES:

1. Java Programming
2. Programming fundamental

## COURSE OUTCOMES (COs):

After completion of this course, the learners will be able to:-

CO #	Detailed Statement of the CO	*BT Level	Mapping to PO #
CO1	Recognize the concept of application development for mobile devices.	BTL2	PO1, PO2,
CO2	Understand the basic technologies used by the Android platform	BTL2	PO1, PO2,
CO3	Recognize and use Android Environment Emulator and Application life cycle	BTL3	PO1, PO2, PO3, PO4
CO4	Develop mobile applications for the Android operating system that use basic and advanced phone features	BTL5	PO1, PO2, PO3, PO4, PO7
CO5	Deploy applications to the Android marketplace for distribution	BTL6	PO1, PO2, PO3, PO4, PO11

# Bachelor of Computer Applications

## UNIT-I

**No. of Hours: 11**      **Chapter/Book Reference: TB1 [Chapters - 1, 2], TB2 [Chapters - 2, 3]**

**Introduction:** Brief history of mobile applications, Different types of mobile applications, Brief history of Android, Introduction to Android Development Environment, Android Application

**Design Essentials:** Anatomy of an Android applications, Creating First Android Application, Creating Android project , Project organization, Setting up real Android device , Setting up Android emulator, Developing simple user interface , Running your first application  
Android terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents, Android Manifest File and its common settings, Using Intent Filter, Permissions.

## UNIT-II

**No. of Hours: 11**      **Chapter/Book Reference: TB1 [Chapter - 3,4,5,6], TB2 [Chapters – 5, 6, 7]**

**User Interface in Android:** Adaptive and responsive user interfaces, User Input Controls, Menus, Screen Navigation, RecyclerView, Drawables, Themes and Styles, Fragments Fragment Life Cycle, Introduction to Material Design.

**Android Application Components:** App Widgets, Processes and Threads, User Interface Components, Views and layouts, Input controls, Input Events, Settings, Dialogs, Menus, Notifications, Toasts, Testing the user interface

## UNIT – III

**No. of Hours: 11**      **Chapter/Book Reference: TB1 [Chapters - 8, 9], TB2 [Chapter - 9]**

Background tasks: AsyncTask, AsyncTaskLoader, Connecting App to Internet, Broadcast receivers, Services, Notifications, Alarm managers.

Sensor, Location and Maps: Sensor Basic, Motion and Position Sensors, Location services, Google maps API, Google Places API

## UNIT- IV

**No. of Hours: 11**      **Chapter/Book Reference: TB1[Chapters - 9, 10], TB2[Chapter - 10]**

**Working with data in Android:** Shared Preferences, App Setting, SQLite primer, Store data using SQLite database, Content Providers, Content Resolver, Loader

**Publishing Your App:** Preparing for publishing, Signing and preparing the graphics, publishing to the Android Market

**Using Common Android APIs:** Using Android Data and Storage APIs, Managing data using Sqlite, Sharing Data between Applications with Content Providers, Using Android Networking APIs, Using android Web APIs, Using Android Telephony APIs, Deploying Android Application to the World.

## TEXT BOOKS:

**TB1.** Lauren Darcey and Shane Conder, “Android Wireless Application Development”, Pearson Education, 2nd ed. (2011)

**TB2.** Wei-Meng Lee,” Beginning Android 4 Application Development”, Wiley India Pvt. Ltd.

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**TB3.** J. F. DiMarzio, “Android: A Programmers Guide”, McGraw Hill Education (India) Private Limited.

## REFERENCE BOOKS:

**RB1.** Paul Deitel “Android for Programmers: An App-Driven Approach” 1st Edition, Pearson India.

**RB2.** Wei-Meng Lee, “Beginning Android Application Development”, Wiley Publishing

List of Practicals		
	Detailed Statement	Mapping to CO#
<b>Core Practicals (Implement minimum 8 out of 10 practicals)</b>		
1.	Create "hello world" application to display "hello world" in the middle of the screen in the emulator as well as android phone	CO1
2.	Create an android app to display various android lifecycle phases.	CO3
3.	Create a calculator app that performs addition, subtraction, division and multiplication operation on numbers.	CO2
4.	Write an Android application to convert into different currencies for example, Rupees to dollar	CO4, CO5
5.	Write an android application to convert a ball from size of radius 2(colour red) to radius 4(colour blue) to radius 6 (colour green). The ball must rotate in circle for 1 minute before changing size and colour.	CO4, CO5
6.	Write an application to mark the daily route of travel in map.	CO4, CO5
7.	Write an application to record video and audio on topic “Intent” and play the audio and video.	CO4, CO5
8.	Create a spinner application with strings taken from resource directory res/values/strings.xml and on changing the spinner value, image will change. Image is saved in the drawable directory.	CO4, CO5
9.	Create an app that uses radio button group which calculates discount on shopping bill amount. Use editText to enter bill amount and select one of three radio buttons to determine a discount for 10, 15, or 20 percent.the discount is calculated	CO3,CO4, CO5

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	upon selection of one of the buttons and displayed in a textview control.	
10.	Create an application that uses checkbox for construction of a shopping list so the user can check off items as they are picked up. The checked items should be displayed in a textview control.	<b>CO4, CO5</b>
11.	Create a login application to verify username and password. On successful login, redirect to another activity that has a textview to display "welcome user" with logout button. On click of logout button, a dialog should appear with ok and cancel buttons. On click of oK button, go back to the login activity and on click of cancel button, stay on the same activity.	<b>CO2, CO4, CO5</b>
12.	Create an application to perform the operations of create, insert, delete, view and update, using sqlite database.	<b>CO4, CO5</b>
13.	Create an application to pick up any image from the native application gallery and display it on the screen.	<b>CO4, CO5</b>
14.	Read phonebook contacts using content providers and display in list.	<b>CO2,CO4, CO5</b>
15.	Create an application to take picture using native application.	<b>CO2,CO4, CO5</b>
<b>Note:</b> <b>1. In total 10 practicals to be implemented. 2 additional practical may be given by the course instructor.</b> <b>2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.</b>		

# Bachelor of Computer Applications

**Course Code: BCA 332**

**Course Name: Seminar/ Conference Presentation**

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<b>0</b>	<b>0</b>	<b>2</b>

## **OBJECTIVE:**

Seminars/Conferences and Presentations provide a platform to the students, where they can learn from what others are doing, learn about new things, ideas and important tips related to new technologies. To foster the Innovations happening in upcoming technologies and harnessing the entrepreneurial opportunities, Institutes must provide ample opportunities to the students to learn and yield the advantages of new advancements in the field of technology. It is expected from a student to learn latest in the industry and write an article related to it and present their findings in front of a panel.

The following points need to be considered while planning and evaluating the presentation

- The seminars must be conducted after every 15 days/ or a month. A minimum of 3-4 seminar sessions can be organized during the semester.
- A minimum of 7-8 slides must be there which would include the title slide. The first slide should be the Introduction slide and the last one reference slide wherein all the links/books references/paper reference to paper must be quoted. The rest of the slides should focus on the technology, application areas etc.
- The title of the seminar must be related to the field of Information technology and must talk about the latest innovation/technology like IOT, Machine learning, Deep learning, AI Cloud computing, Mobility, Hand held devices, Social Computing, NOSQL Database, CRM, Social CRM, Open Source Application Development Frameworks, Zero Trust Security Framework/ Architecture, Big Data/ Data Lake, Emerging and Innovative Technologies, Conversational AI, Sentiments Analysis, DevOps, Real time Analytics, Fraud Detection. Proper approval must be taken before starting the work.
- Student's feedback must be taken after taking the seminar as to what learning they have gathered after studying the topics. For this, a feedback form may be designed using Google form utility.

# Bachelor of Computer Applications

**Course Code: BCA 372**

**Course Name: Practical-XII IOT Lab**

**L T C**  
**0 4 2**

## LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:

5. To learn and understand the concept of Internet of Things (IOT).
6. To study the constituent components of Internet of Things.
7. To design and develop IoT applications using different, Sensors/actuators.
8. To seek working knowledge of Arduino, Raspberry pi Boards and to develop cloud based IOT projects.

## PRE-REQUISITES:

3. Basic Programming Knowledge
4. Use of Internet

## COURSE OUTCOMES (COs):

After completion of this course, the learners will be able to:-

CO#	Detailed Statement of the CO	*BT Level	Mapping to PO #
CO1	Understand the architecture and the functional blocks of Internet of Things.	BTL2	PO1, PO2, PO3
CO2	Explain the concepts of Internet of Things and gain knowledge to design IoT applications	BTL2	PO1, PO2, PO3,PO7, PO10
CO3	Demonstrate the process of capturing and analyzing data in Internet of Things.	BTL3	PO1, PO2, PO3,PO4
CO4	Examine the various components involved in IoT design methodology.	BTL4	PO1, PO2, PO3,PO4,PO7
CO5	Evaluate an IoT device to work with a Cloud Computing infrastructure.	BTL5	PO1,PO2,PO3, PO4,PO11
CO6	Implement IoT protocols for communication.	BTL6	PO1,PO2, PO3,PO4, PO6, PO7,PO8

## List of Practicals

S.No.	Detailed Statement	Mapping to CO #
1.	Study and Install IDE of Arduino	CO1,CO2
2.	Write the steps to add libraries in Arduino and setup of Arduino IDE for	CO2, CO3

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	programming.	
3.	Write a Program using Arduino for Blink LED.	CO2, CO3
4.	Write a Program for monitoring Temperature using Arduino and LM35 Temperature Sensors.	CO2, CO3,
5.	Write a Program for Controlling Raspberry Pi with WhatsApp.	
6.	Write a program to shows how to fade an LED on pin 9 using the analog Write( ) function.	CO3,CO4
7.	Write the steps to add blynk libraries for NodeMCU and account on IFTTT for home automation.	CO2, CO3,CO4
8.	Write a program of Fade LED using NodeMCU(ESP8266) and blynk app	CO2, CO3,CO4
9.	Write a program for Arduino by using Ultrasonic sensors and servo motor (HC-SR04), and make a smart dustbin.	CO2, CO3,CO4
10.	Write a program for controlling bulb on/off by using Blynk app.	CO2, CO3,CO4
<p>Suggested IOT based Applications</p> <ol style="list-style-type: none"> <li>1. Create home automation project for controlling electrical home appliances via Google assistant or any other IOT based project may be undertaken.</li> <li>2. Setting up Wireless Access Point using Raspberry Pi.</li> <li>3. Fingerprint Sensor interfacing with Raspberry Pi</li> <li>4. Raspberry Pi GPS Module Interfacing.</li> </ol> <p>Visitor Monitoring with Raspberry Pi and Pi Camera</p>		
<p><b>Note:</b></p> <ol style="list-style-type: none"> <li>1. In total 10 practicals and one application to be implemented. 2 additional practical may be given by the course instructor.</li> <li>2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.</li> </ol>		



# Bachelor of Computer Applications

**Course Code: BCA 374**

**L**

**T C**

**Course Name: NSS/NCC/Cultural Clubs/Technical Society/Technical Club**

**- - 2**

**NUES:** Comprehensive evaluation of the students by the concerned coordinator of NSS/NCC/Cultural Clubs/Technical Society/Technical Club, out of 100 as per the evaluation scheme worked out by these activity societies, organizations at the institution/ university level; the coordinators shall be responsible for the evaluation for the same. These activities shall start from the first semester and the evaluation shall be conducted at the end of sixth semester for students admitted in the first semester.

# **Bachelor of Computer Applications**

## **Note on Examination of Elective Papers:**

- (a) Papers with only theory component shall have 25 marks continuous evaluations by the teacher and 75 marks term-end examinations. Both these component marks shall be reflected on the marksheet of the student.
- (b) Papers with only practical component shall have 40 marks continuous evaluation by the teacher and 60 marks term-end examinations. Both these component marks shall be reflected on the marksheet of the student.
- (c) Papers with both theory and practical components shall have 25 marks continuous evaluation by the teacher and 25 marks term-end examinations for practical and 50 marks term end examination for the theory component. All three component marks shall be reflected on the marksheet of the student.

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## Important Instructions:

1. The examination, attendance criteria to appear in examination, promotion and award of the degree shall be governed by the Ordinance 11 of the University. The term “major discipline” / “primary discipline” in this document refers to the discipline in which student is admitted/studies from 3<sup>rd</sup> semester onwards.
2. Minimum duration of the Bachelor of Computer Applications (BCA) programme shall be 3 years (N=4 years) (6 semesters).
3. Maximum duration of the Bachelor of Computer Application (BCA) programme shall be 5 years (N+2 years). After completion of N+2 years of study, if the student has appeared in the papers of all the semester upto 6<sup>th</sup> semester, then a maximum extension of 1 year may be given to the student for completing the requirements of the degree if and only if the number of credits already earned by the student is atleast 120. Otherwise, the admission of the students shall stand cancelled. After the period of allowed study, the admission of the student shall be cancelled.
4. The MOOC courses may be taken through SWAYAM / NPTEL MOOCs platform. The student desirous of doing a specific MOOC based course must seek approval of the APC of the institution for the same before the commencement of the semester. The APC shall allow the MOOC paper to the student if and only if the MOOC subject / course being considered for the student is being offered in line with the Academic Calendar applicable. The student shall submit the successful completion certificate with marks to the institution for onwards transfer to the Examination Division. The Examination Divisions shall take these marks on record for calculation of the SGPA/CGPA of the student concerned by the examination division of the University. Though the result of the MOOC courses may be declared subsequently. The MOC course credits shall not be considered for calculation of the promotion criterion from one academic year of study to the next academic year.
5. Maximum Credits: at least 162. The student has to appear in the examinations for these credits in all components.
6. Minimum Credits: atleast 150.
7. To earn an Honours degree, the student may enroll for 20 credits or more through SWAYAM / NPTEL MOOCs platform. This point has to be read together with other points

# **Bachelor of Computer Applications**

especially point 8. The acquisition of the credits should be completed before the 15th of the July of the admission year plus 3 years. That is, if a student is admitted in the year X, then these credits must be acquired through MOOCs by 15th July of the year (X+3), no extra duration or time shall be allocated. Honours in the degree shall be awarded if and only if at least 20 credits are acquired through MOOCs. To obtain Honours in the programme, the student must apply to the institution about the same, before the commencement of the 2nd semester and about registration for the MOOCs and the specific courses through MOOCs shall be registered by the student only after approval by the Academic Programme Committee (APC) of the Institution. The APC shall approve the course if it is not already studied by the student or the student shall not study it in future and adds value to the major area of specialization (which is the degree). The papers for which the student desires to appear for Honours through MOOCs, all papers results shall be submitted by the student to the school for onwards transfer to Examination Division of the University, to be taken on record of the University. The results of these papers shall be a part of the records of the examinations of the students. The records shall be submitted by the student to the school, then transferred to the Examination division, shall be notified by the examinations division of the University, and a separate marksheet shall be issued by the Examinations divisions. The cost of taking the MOOC course is to be borne by the concerned student. Such courses shall be reflected as additional courses / papers for the student. The “Honours” in the degree shall be awarded if and only if in addition to the 20 credits earned as specified the student has a CGPA of 7.5 or above.

If a student acquires less than 20 credits through MOOCs, following the mechanism specified, then also the results of these papers shall be taken on record as specified above, though no Honours degree shall be awarded. The papers through MOOCs for Honours degree shall not be a part of the set of the papers over which the SGPA / CGPA of the student shall be calculated.

The paper through MOOCs for Honours degree shall be additional papers studied by the students and are to be taken into account only for award of Honours in the degree

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programme, if 20 credits are earned through MOOCs as approved by APC, by a student. See Clause 8 also.

8. The following degree route can be taken by a student (also refer point 7):
  - a. A degree with the nomenclature **Bachelor of Computer Applications with minor specialization in <Discipline Specific Elective Group Name> (Honours)** shall be awarded if the following conditions are satisfied:
    - i. The student has acquired 150 credits, to meet the minimum credit requirement.
    - ii. The student has acquired 20 credits from one Discipline Specific Elective Group.  
Student must pass all the subjects of Discipline specific course for the award of Bachelor of Computer Applications with Specialization.
    - iii. The honours in the degree shall be specified on the degree certificate if the student fulfills the criteria at point 7 and also has a CGPA of 7.5 or above.
  - b. A degree with the nomenclature **Bachelor of Computer Applications (Honours)** shall be awarded if and only if the following conditions are satisfied:
    - i. The student does not fulfil the criteria (a) above.
    - ii. The student has acquired 150 credits, to meet the minimum credit requirement.
    - iii. The honours in the degree shall be specified on the degree certificate if the student fulfills the criteria at point 7 and also has a CGPA of 7.5 above.
  - c. A degree with the nomenclature **Bachelor of Computer Applications with minor specialization in <Discipline Specific Elective Group Name>** shall be awarded if and only if the following conditions are satisfied:
    - i. If the student does not fulfil the criteria at (a) and (b) above.
    - ii. The student has acquired 150 credits, to meet the minimum credit requirement.
    - iii. The student has acquired 20 credits from one Discipline Specific Elective Group.  
Student must pass all the subjects of Discipline specific course for the award of Bachelor of Computer Applications with Specialization.
  - d. A degree with the nomenclature **Bachelor of Computer Applications** shall be awarded if and only if the following conditions are satisfied:

# **Bachelor of Computer Applications**

- i. The student does not meet the criteria at (a), (b) and (c) above.
  - ii. The student has acquired 150 credits, to meet the minimum credit requirement.
- 9. Pass marks in every paper shall be 40.
- 10. Grading System shall be as per Ordinance 11 of the University.
- 11. The medium of instructions and examinations shall be English.